



### **III. PROCESS IMPROVEMENTS**

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**Force Protection**

**Acquisition**

**Information Management and Telecommunications (IM&T)**

**Commissioning**

**Tenant Moves**

**Sustainable and Constructability Design**

**Program Management**

### III. Process Improvements

## FORCE PROTECTION



*Department of Defense security requirements are the driving factor behind many decisions affecting the Pentagon Renovation Program.*

Meeting the Force Protection needs of the Department of Defense has always been a top priority of the Pentagon Renovation Program. Early initiatives included the construction of the Remote Delivery Facility, a 250,000-square foot shipping and receiving facility, adjoining the Pentagon. The Remote Delivery Facility significantly improves physical security by providing a secure, consolidated location for receiving and screening thousands of items shipped to the building each day. The Remote Delivery Facility opened for operation on August 31, 2000. The area of the building containing maintenance shops was completed in December 2001. The entire project was completed in February 2002, with the tie-in of the facility systems to the Pentagon.

The Metro Entrance Facility Project was the result of a Congressional mandate to upgrade the security of the Pentagon's Metro Entrance. The first phase was the relocation of the bus loop to increase the standoff distance between the Pentagon and buses and other large vehicles. This was completed on December 16, 2001 with the opening of the new Pentagon Transit Center. The second phase of the project includes the construction of a new entrance facility adjacent to the face of the Pentagon. This will provide a more secure entrance and screening point for Pentagon visitors.

Additional enhancements were incorporated into the Pentagon's fire and life safety systems, including fire sprinklers, automatic fire doors, compliance with the Americans with Disabilities Act to facilitate emergency egress and redundant exterior communications. The replacement of exterior high pressure water lines ensures dependability in the event of a fire or other life threatening event. New monitoring and control systems have been installed as part of a new Building Operations Command Center. This allows all of the Pentagon's building systems to be accessed from a single location.



The security enhancements made to Wedge 1 are credited with saving lives on September 11. Three features in particular have been recognized as contributing to the low casualty rate. New blast-resistant window units were installed in all of the E-ring offices and the inner courtyard. Steel beams were installed to reinforce the outer wall and a geo-technical mesh, similar to Kevlar, was stretched between the steel beams to prevent debris from becoming shrapnel in the event of an exterior explosion. The blast windows directly above and adjacent to the airplane's point of impact did not shatter and the steel reinforcements prevented the E-ring from collapsing for approximately 30 minutes after impact. These extra security measures proved invaluable and will be replicated with minor adjustments during the renovation of Wedges 2 through 5.

In the aftermath of the terrorist attack, the U.S. Army Corps of Engineers, at the request of the Pentagon Renovation Program, conducted a structural analysis, the "Pentagon Rebuild Retrofit Study," to determine how the building and its components performed. After examining building design, materials and operations, it was determined that the building performed remarkably well. Nevertheless, there is room for improvement.

Similarly, the Pentagon Renovation Program convened a



*The Renovation Program convened a task force to evaluate the performance of the Pentagon's infrastructure in the wake of September 11.*

**III. Process Improvements****Force Protection**

*Task force members inspect an automated smoke door. Tyvek suits and masks were required due to mold contamination.*



*The fire continued to burn in Wedge 2 for two and a half days.*

task force including members of the Pentagon Building Management Office, Federal Facilities Division, and responding rescue and fire personnel to evaluate the building's performance and enhance emergency preparedness. Those individuals that were in the vicinity of impact on September 11 were interviewed and asked to share their experiences and give suggestions. The information gathered from the task force interviews were consolidated into 26 primary recommendations that will be integrated into the performance specification requirements for future Pentagon renovation contracts.

A second multi-agency task force, the Pentagon Force Protection Project Action Team, including members of the Pentagon Renovation Program, is reviewing lessons learned and formulating ways to better enhance the Pentagon's force protection.

Lessons learned include the need for better education about emergency evacuation procedures. For example, the automatic smoke doors in Wedge 1 operated as they should. They deployed from side closets as smoke filled the hallways, thus preventing the circulation of smoke to other areas of the building. With the touch of a waist-high handle, they open wide enough for a wheel chair to pass before shutting automatically. However, Pentagon personnel that encountered the closed smoke doors became disoriented by the unfamiliar barriers. Even if all personnel were trained on their operation, the handle to retract the wall should probably be located near the floor, where survivors are more likely to be crawling towards safety to avoid the smoke. Appropriate changes are being implemented.

Short-term, the project action team is developing an "Integrated Emergency Plan" which couples the existing Pentagon fire emergency plan with a larger, better-equipped Incident Response Team. This larger Incident Response Team will be composed of Pentagon personnel that are experienced in techniques including backpack pressurized breathing equipment and are trained to Firefighter 2



level. This Incident Response Team will additionally develop a collaborative relationship with external organizations such as area fire and rescue teams, which will clearly outline the person in charge. The Incident Response Team, as experts in Pentagon operations and maintenance, will report, in the event of an incident, to the Incident Commander of the local county fire department.

The need for an upgraded emergency notification system became apparent as well. The public address system on September 11 was inaudible in many non-renovated areas of the Pentagon. As done in Wedge 1, the Pentagon Renovation Program will, as part of the renovation process, install stand-alone public address systems within every room in the Pentagon. An automatic messaging system that delivers emergency announcements via telephone is also being considered.

Long-term, the Pentagon Renovation Program will harden newly renovated radial corridors with Concrete Masonry Units (CMUs) and make them better resistant to fire with fire-rated wall board. The building will thus be compartmentalized, making it more difficult for fire to spread. These hardened corridors will additionally serve as areas of refuge and enhance blast resistance and protection from a



*Deputy Secretary of Defense, Paul Wolfowitz, visits the crash site the night of September 11.*

chemical, biological or radiological attack. Additional improvements will be made to handicapped access and egress as renovation continues.

The Pentagon Renovation Program is working with agencies including the U.S. Army Corp of Engineers, the Defense Threat Reduction Agency and Arlington County to better strengthen building components. In the short term, the Pentagon Renovation Program is working with Defense Protective Services to increase stand-off distances from the face of the Pentagon.

Long term planning involves hardening and strengthening mission critical facilities and support utilities..

### III. Process Improvements

## ACQUISITION

Fiscal Year 2001 (FY 2001) began with the expectation of a year-long focus on conducting competitions for the award of new Pentagon Renovation projects, an activity which required careful planning and execution. The year concluded with an unexpected surge of expedited, emergency contracting activity in response to the September 11 terrorist attack on the Pentagon. The Renovation Program successfully executed these diverse activities such that the Program is on track to conclude the renovation by 2010.

### *Wedges 2-5*

With the beginning of FY 2001, the source selection for the award of the remaining Wedges 2-5 contract was in its second and final phase. Three of the best design-build construction teams in the nation had been selected in Phase 1 to compete for the eventual contract award, which was valued at \$700 million (without inflation).

Three other design-build competitions were also being conducted concurrently: the Pentagon Physical Fitness and Readiness Facility, Navy Basement build out and the Pentagon's Heating and Refrigeration Plant Intake and Outfall system.

All the above acquisitions were structured and executed around three interdependent principles that have been central to the Renovation Program's success:

- Conduct an open competition and select a contractor based on best value as defined by past performance, quality of work and cost.
- Include performance-based requirements in the contract to induce creative, innovative thinking.
- Offer incentives to keep the contractor focused on customer satisfaction and performance; This creates



*Execution of the design-build agreement for Wedges 2-5.*

a win-win for both parties.

The year culminated in the award of the W2-5 contract. The W2-5 source selection is undoubtedly the largest and most complex in the Program's history. The source selection included the use of techniques such as early and continuous industry involvement; emphasis on past performance, performance-based requirements, oral presentations, build to budget, best value, most probable cost analysis, and full and open unsuccessful offeror debriefings. While it's unlikely the Program will sponsor another competition of this magnitude and complexity, its all-encompassing business approach has made it the springboard from which others are now derived and appropriately tailored.

### *Participation by Socio-Economic Concerns*

Following September 11, the Program made a concerted effort to quickly identify small and small disadvantaged business companies to aid in the Pentagon recovery effort both as prime contractors and subcontractors. The Renovation joined forces with George Mason University's Procurement Technical Assistance Program (PTAP) office to co-sponsor a Small Business Industry Day on October 23, 2001 at the University's Johnson Center in Fairfax, Virginia. To ensure that small businesses across the country



were informed, we called upon local congressional offices for their assistance in getting the word out to their constituents. Five hundred visitors attended (some from as far away as the West Coast) representing over 350 small and small disadvantaged businesses. The Renovation Program prime contractors and several current subcontractors attended to discuss potential subcontracting prospects.

As a result of the Industry Day, over 300 businesses have registered in our database, giving us an initial pool of small businesses that can be accessed by our contracting officers in search of small business prime contractors, and to our prime contractors in search of small business subcontractors.

Following the Industry Day, the Renovation Program participated in several other events to further increase the awareness of small business in potential prime and subcontract opportunities. These included a Small Business Administration Job Fair, a Native American & Alaskan American Workshop, and a Procurement Fair and Business Expo sponsored by Congressman Albert Wynn.



*Program staff met with 379 companies at the Small Business Expo on October 23, 2001.*

## September 11 Rescue & Recovery Support

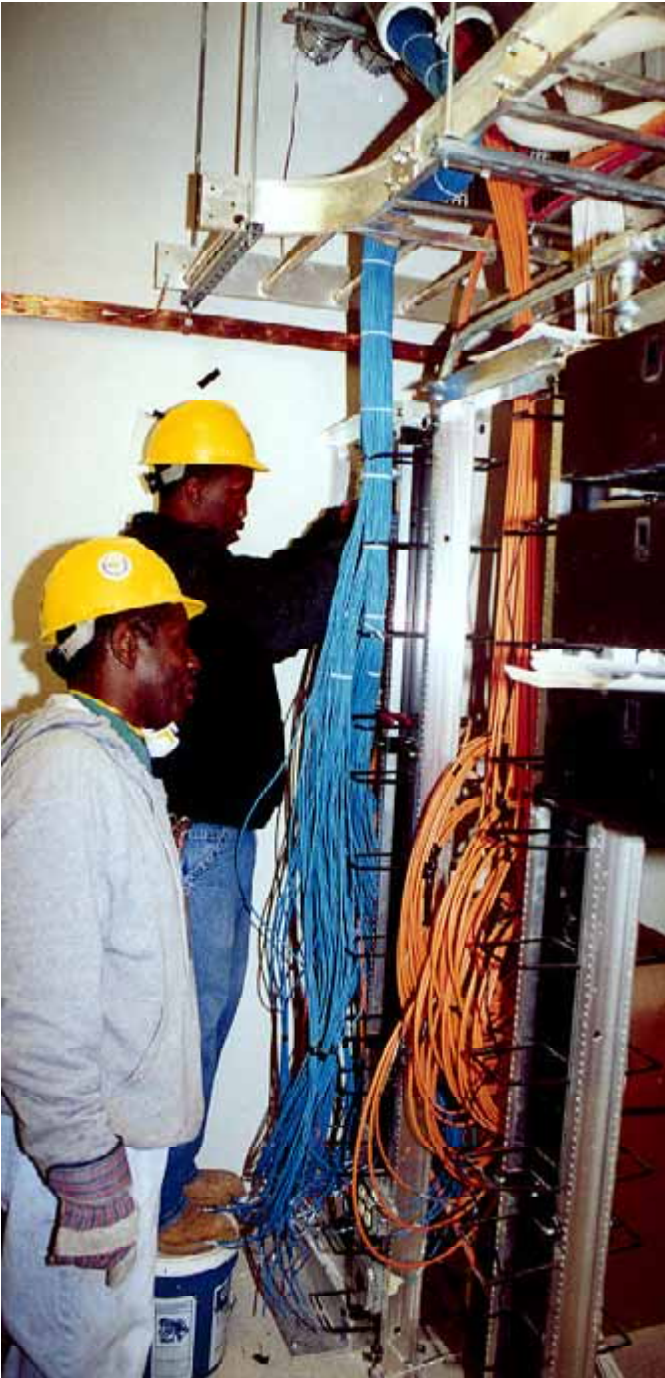
On September 11, our mission grew considerably. Within hours after the terrorist attack on the Pentagon, Renovation personnel mobilized on-site contractors with available heavy equipment to assist Arlington County fire and rescue operations. Program contracting officers acquired or leased tents, chairs, emergency lighting, generators, and other rescue equipment, gear, and supplies totaling over \$60,000 in the month following the attack. These purchases supported on-site rescue, recovery, and investigation activities executed by the FBI, FEMA, Arlington County, and the DoD. The availability of the IMPAC Credit Card mechanism made this type of support possible, and the FBI credited this type of support with dramatically reducing the amount of time they typically would have needed to complete an investigation of this magnitude.

Within five days of the attack, the Program had issued emergency letter contracts valued not to exceed \$570 million to recover and reconstruct the damaged portions of the building.



### III. Process Improvements

## INFORMATION MANAGEMENT & TELECOMMUNICATIONS (IM&T)



*Telecommunications technicians install new telephone lines in Wedge 1.*

Related to the Pentagon Renovation Program is a necessary modernization of the building's information management and telecommunications infrastructure and systems. The basic information system infrastructure in the Pentagon was installed long before the advent of personal computers, facsimile machines, video teleconferencing, and digital telephone service, and has evolved without a design plan. In 1943, when the Pentagon was built, there was one telephone for every three employees. Over the last 57 years, new information technology capabilities have emerged and the new systems have been laid on top of the old. Over time, this merging of technology has become unmanageable and not easily upgraded. As requirements emerged, facilities and systems were added with little or no regard to existing capabilities or long term requirements. The individual military departments and agencies engineered and installed equipment and cables to meet their immediate specific needs.

The 25,000+ workers at the Pentagon require state-of-the-art systems and netronics that will provide immediate access to local as well as world-wide networks and the tools to rapidly collect data, analyze it, and present it to decision makers in a timely manner. This requirement defines the objectives of the IM&T Project:

- Provide modern telecommunications and information management services throughout the Pentagon with access to global networks. The communications network will support voice, data, and video at varying security levels.
- Define, procure, integrate, and test hardware and software items necessary to meet functional requirements for a consolidated Network Systems Management Center.
- Relocate all command and operations centers to renovated facilities. These include the Air Force Operations Group, Navy Command Center, Marine

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IM&T



Corps Command Center, National Military Command Center, and the Army Operations Center.

- Modernize and consolidate the functions of the seven technical control facilities in a single Pentagon Consolidated Technical Control Facility.
- Relocate the Defense Information Systems Agency, Joint Staff Support Center, Command and Control Automated Data Processing Centers from existing facilities into one new facility located in renovated space.
- Paralleling the Command and Control Automated Data Processing efforts, develop a consolidated, shared Business Automated Data Processing Center which will provide a modernized data processing facility for Army and Air Force systems. The Business Automated Data Processing Center will house mainframe processors, large servers, and their peripheral equipment, including storage devices and network processors.
- Three to four consolidated server facilities will be built in each wedge. These server facilities will allow the many server requirements of all services and agencies to be consolidated into these 18 common facilities without the need to build hundreds of special purpose facilities throughout the building.
- Provide the renovated Pentagon with improved voice communications currently provided by 22 Command and Control, Tactical, and Administrative telephone switches located in 12 different facilities. Refurbish, upgrade and install the primary and secondary classified and unclassified Command and Control telephone switches. Install the Main telephone patch panel in the General Purpose Switch Room and reduce the number of telephone switches in the Pentagon from 22 to eight.

### IM&T Security Improvements

#### Basic Concepts/Goals

- Provide dispersion and multiple nodes (points of presence) for selected, vital command communications systems to enhance survivability from attack.
- Provide smart technology with capacity to route command communications systems around a breach from attack in the system.

#### Systems selected for survivability enhancement

- Voice Telecommunications
- Network (Electronic Transport Systems)
- Data (Electronic Storage & Retrieval Systems)
- Messaging (Electronic Communications Systems)



**III. Process Improvements****IM&T**

*A consolidated server room in Wedge 1.*

- Replace the 130 radio systems distributed throughout the building with 1 Consolidated Radio Room in each wedge.

The renovated Pentagon will include a 30,000-line administrative telephone switch providing voice services through optical fiber-based distributed telephony; common user systems such as e-mail and messaging; collocated automatic data-processing facilities; an information infrastructure of fiber optic and copper cable; a common user data, voice, video backbone (4 levels of classification); and a single Network Systems Management Center. In an effort to maintain currency with evolving technologies, a higher bandwidth network technology (Gigabit) insertion within the data communications network of the renovated Pentagon was implemented, thereby providing for increased data bandwidth availability for information technology services.

The Renovation Program's IM&T team continues implementation of the distributed telephone switching architecture, which employs fiber optic cabling to facilitate redundancy and survivability of voice services while eliminating massive pathway and copper cabling requirements in the building.

**IM&T PROJECT STATUS**

This past year has been fast-paced and much has been accomplished. The primary emphasis in 2001 was completing renovation of the first above-ground Wedge of the Pentagon. This work was only weeks away from completion when terrorist struck the Pentagon on September 11 and damaged and/or destroyed much of the newly-completed Wedge 1 and portions of Wedge 2. The IM&T Project Office has been significantly engaged in recovery operations resulting from that attack and in restoring the Pentagon to its pre-attack condition in addition to continuing to implement the IT renovation for the remainder of the building.



*A new Data Switch unit in Wedge 1. The unit will be online in March 2002.*



### CHALLENGES

One of the biggest challenges faced by IM&T workers is the coordination involved with doing new system updates without disrupting the current systems being used by Pentagon employees. Adding to the difficulty is the 16,000 miles of undocumented wiring that exists in unrenovated wedges of the Pentagon.



*Workers reconnect phone lines in Wedge 2.*



*Back up battery installation in Wedge 1*



*Technicians install the under-floor cable system in a Wedge 1 tech facility.*

### III. Process Improvements

#### COMMISSIONING BENEFITS

- Improved system performance
- Improved operation and maintenance
- Improved indoor air quality
- Improved energy efficiency
- Reduced warranty callbacks



Testing begins on a Wedge 1 electrical vault. The original vault was destroyed in the September 11 attack. This particular test measures the integrity of the wiring that feeds the vault.

#### COMMISSIONING

Commissioning is the process verifying and documenting that the performance of building systems achieve the design intent and meet the owner's functional and operational needs.

The primary goal of Commissioning is:

1. *Identifying and documenting Owner needs and requirements of the facility;*
2. *Verifying that designed systems are commensurate with Owner needs;*
3. *Verifying that systems installed are operable and maintainable;*
4. *Testing of systems to verify that they are performing optimally;*
5. *Verifying that design intent, installation, Operations and Maintenance requirements are well-documented;*
6. *Training operators and facility staff to ensure maintainability.*

Commissioning goes beyond testing, adjusting, and balancing and traditional inspection services. Commissioning involves functional performance testing to determine how well building systems, such as fire safety, mechanical and electrical systems, work together. Commissioning seeks to determine whether equipment meets a facility's operational goals or whether it needs to be adjusted to improve efficiency and overall performance. These activities are not, as many owners and managers believe, part of the typical design and construction process or part of standard operations and maintenance procedures.

#### IMPLEMENTATION STATUS

The integration of the Commissioning process into Pentagon Renovation Projects was accomplished in phases. Seven major projects incorporating



### III. Process Improvements

### Commissioning

Commissioning are: the TRICARE Health Clinic, Wedge 1, the Remote Delivery Facility, the Metro Entrance Facility, Intake/Outfall, the Physical Fitness and Readiness Facility and Wedges 2-5.

The TRICARE Clinic was completed in February 2000, with commissioning incorporated near the end of core and shell construction. Final commissioning close out documentation and warranty were completed in 2001.

The Wedge 1 core and shell construction phase was just beginning when commissioning activities began. Commissioning included building system design reviews and equipment and product data submittal reviews. As with the TRICARE Clinic, commissioning activities included reviews of operations and maintenance manuals, training plans, equipment startup checklists, functional performance tests, and "as-built" drawings. For Wedge 1, operations and maintenance manuals were expanded upon, providing detailed system descriptions tying together various component O&M manuals. The Wedge 1 commissioning also included execution of equipment startup checklists and functional performance tests for life safety, mechanical, and electrical systems.

The Remote Delivery Facility is the first Pentagon Renovation project to start commissioning with the onset of construction. Commissioning here began with technical reviews of the Conceptual Design, Basis of Design, and the Design Intent documents, and continued throughout all design phases and into the construction phase. Commissioning activities included reviews of operations and maintenance manuals, training plans, equipment startup checklists, functional performance tests, and 'as built' drawings.

For the Metro Entrance Facility, Wedges 2-5, Intake/Outfall, and Physical Fitness and Readiness Facility projects the commissioning process was also fully integrated from the start. Commissioning activities here began with technical reviews of the Conceptual Design and RFP design criteria. After award of each project,

#### THE GOAL OF COMMISSIONING:

*"Commissioning seeks to determine whether equipment meets a facility's operational goals or whether it needs to be adjusted to improve efficiency and overall system performance."*

#### SCOPE OF COMMISSIONING SERVICES

*Commissioning at the Pentagon includes the following building systems:*

1. Normal Power Supply System
2. Emergency Power Supply System
3. Standby Power Supply System
4. Life Safety Systems
5. Fuel Oil Leak Detection System
6. Waterproofing System
7. Heating, Ventilation, and Air Conditioning Systems
8. Direct Digital Controls Systems (Energy Management and Controls Systems)
9. Fire Alarm/Fire Protection and Fire Suppression Systems
10. Electrical Distribution System
11. Building Envelope (including energy efficiency)
12. Potable Water System (including cross connection control/backflow prevention)

commissioning has followed the same path laid out by the Remote Delivery Facility, incorporating lessons learned from the TRICARE Clinic, Wedge One, and the Remote Delivery Facility.

### **CHALLENGES**

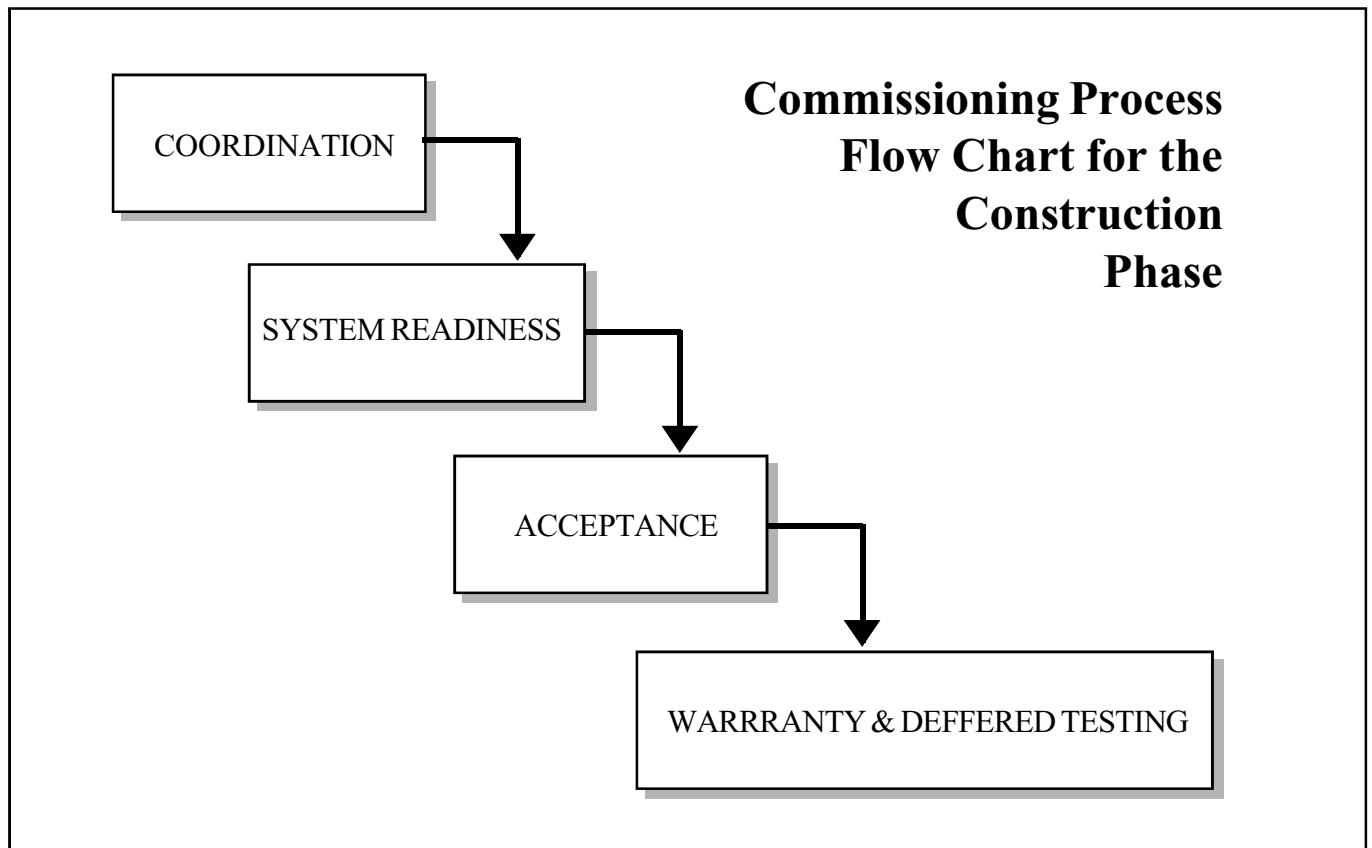
Due to the September 11 attack, the commissioning effort at Wedge 1 had to be modified to incorporate retesting of systems. Some areas affected by the blast or subsequent fire, smoke, and water damage had to be retro-commissioned.

### **REQUIREMENT**

Executive Order 12902, March 8, 1994, Energy Efficiency and Water Conservation at Federal Facilities, Section 306, requires that a facility commissioning program be established for all new or renovated buildings and refers specifically to ensuring that performance standards, as set forth in 10 CFR 435, are met.



*A contractor testing and calibrating the air flow in the Wedge 1 HVAC ducts.*



### III. Process Improvements

#### TENANT MOVES

Due to logistical constraints presented by the building, its security requirements, and the necessity to minimize downtime and disruption to employees' daily activities, the Renovation Program has created an innovative process to relocate tenants while maintaining the renovation schedule. To accomplish these tasks, the Pentagon Renovation Program established a Relocation Planning Team (RPT), whose primary responsibility includes:

- Providing agency-specific relocation checklists, which give the tenants an “itemized” list of tasks to be accomplished prior to, during, and after, the move. In addition, each move involves:
  - *Relocation Handbooks, which instruct tenants on packing and labeling procedures and “Move Packets”, which include pre-printed labels and check-out sheets;*
  - *Post-move questionnaires are provided, which give the tenants an opportunity to provide the Program feedback on the relocation process, new space, furniture, systems, etc. These documents and forms have been made accessible to all Pentagon employees electronically, thus saving the government printing costs.*
- Coordinating the logistical and security requirements between the movers and the affected agencies, such as the Defense Protective Service, Information Management and Telecommunications, the Dockmaster, and the Pentagon Building Management Office.

The RPT has saved the Government approximately 25-percent, when compared with industry standards through very comprehensive up-front planning and an intimate understanding of the dynamics of the Pentagon itself.



*Navy tenants inspect Wedge 1 before moving in to their new offices.*

The decision to procure moving services through a multiple award contract has enabled flexibility in move assignments, maintained move contractors in a consistently competitive environment, and removed constraints on resources while still ensuring a prudent expenditure of funds. Some notable accomplishments are:

- Negotiating cost for each move and overseeing the move to ensure adherence to the Government's requirements.
- Tracking, coordinating and overseeing the delivery and installation of furniture, furnishings, and equipment for tenants being relocated to renovated space as well as coordinating and overseeing the removal of surplus items. This is accomplished with a small disadvantaged contractor
- Coordinating cleanup of the new space prior to occupancy. This is also accomplished with a small disadvantaged contractor
- Relocation of approximately 11,800 personnel from various wedges to external swing space locations, as well as to internal Pentagon locations.

The process developed by the RPT has further saved the government money by establishing moving service contracts that allow the Program to handle activities that



may not usually fall under a mover's purview. For example, the movers can provide cleaning services, subcontracting services for specialty equipment with warranties that require a certain vendor to perform the services, personal computer de-certification and re-certification services, etc. This flexibility allows the Program to handle a variety of tenant requirements.

Understanding the difficulty in adhering to schedules of the magnitude the Pentagon renovation requires, the Program procured 104,000 square-feet of warehouse space to temporarily store new construction materials, furniture, furnishings, and information technology equipment in support of the renovation.

To many, the successful relocation of the tenant to temporary or permanent space represents the end of the process. For the Program, however, the activities following the relocation are critical to the overall success of the renovation. The space vacancy and turnover process has been a significant factor for the renovation schedule. The coordination between the Renovation Program and all stakeholders to de-certify a space for demolition has been honed into a finely tuned process. The Program is responsible for removing the surplus furniture, furnishings, and equipment from vacated tenant space. To do this, the Program must inventory, identify surplus, and present to potential customers any furniture, furnishings, and equipment not being relocated to renovated space. Based on the condition of the surplus items, the Renovation Program has to determine, in accordance with applicable regulations, if the items will be presented for re-use within the government, donated to charitable organizations or deemed excess property and officially disposed of. The Renovation Program must then coordinate with the various other partners in order to allow the disconnection of utilities, removal of secure lines, telephone lines and equipment, etc. The Program then coordinates a trash removal activity with its cleaning contractor in order to officially turn over a space to the demolition and abatement contractor to begin renovation. These myriad coordination activities have been reduced to a one-month duration after tenant move-out.



*Movers deliver computers from Wedge 2 into the newly renovated Wedge 1.*

## POST SEPTEMBER 11 ACTIVITIES

The Relocation Planning Team and its vendors responded quickly and effectively, assisting the Pentagon occupants with:

- Removing salvageable furniture, furnishings and equipment from the damaged areas in the Pentagon and placing them in short term storage.
- Conducting around the clock moves in support of displaced tenants due to the incident.

## **ACTIVITY STATUS - PROJECTS IN DESIGN**

The Renovation Program has a back-to-basics approach for all activities. Based on the lessons learned from the Wedge 1 move-outs and subsequent moves into swing space and new permanent space, the Program will perform the following activities by simplifying our move process, and begin to work closely with the design-build contractor in support of the following activities:

**III. Process Improvements****Tenant Moves**

- **FY 2003** – The Renovation Program will handle the furniture tracking, delivery, and installation oversight, as well as the relocation planning, moves, and surplus removal services as it relates to the occupancy of Wedges 2 and swing spaces. The renovation will continue to provide pre-move cleaning and minor repair services for the renovated Pentagon space. Again, this will be accomplished using a small disadvantaged business. In addition, the Renovation Program will continue to use its three moving services contractors in support of the moves.



*Wedge 1 Help Desk staff are available to provide Pentagon tenants with an immediate response to move-related questions.*

### III. Process Improvements



*During construction of the new bus facility recycled materials were used. Recycled concrete was used for the base material of all roadways and sidewalks*



*Landscaping on the RDF roof. Between 12"-18" of topsoil was placed on the roof to allow planting of grass and other varieties of plants and shrubs. The Potomac River is being used as an alternative irrigation system.*



*Solar array panel testing site used to increase energy efficiency. At max load the solar panels can produce 30kw/hr.*

### SUSTAINABLE CONSTRUCTION

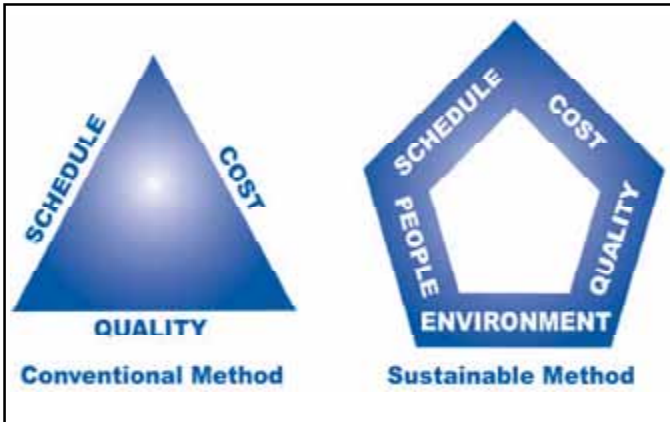
The Pentagon Renovation Program (PENREN) is committed to incorporating sustainable design considerations and innovative management processes into each project undertaken. While many organizations have recently stated their support for sustainable design and its precepts, the Program has progressed beyond mission statements, charters, and verbal expression of support. In August 2001, as a culmination of previous efforts, the Integrated Sustainable Design and Constructability (ISDC) Team became a viable part of the organization at the Program. Since September 11, the Pentagon Renovation Program and its ISDC Team shouldered the additional responsibility of integrating and balancing sustainable design issues with Force Protection measures necessary to protect the Pentagon.

The complex nature of PENREN projects requires the ISDC Team to incorporate sustainable design into the overall acquisition and management strategy of the Program. The acquisition strategy includes innovative "performance-based" contracting, and "design-build" methodology.

The ISDC Team charter is to "be an ongoing source of information, guidance and direction for the reasonable integration of sustainable design and construction for all Pentagon Renovation projects." To illustrate the breadth and significance of the Program's commitment to excellence in sustainable design, the following projects will be attempting to obtain Leadership in Energy and Environmental Design (LEED) certification from the United States Green Building Council (USGBC) over the next ten years: (1) the Metro Entrance Facility (MEF); (2) Wedges 2-5; (3) the Remote Delivery Facility; (4) the Intake/Outfall Project (5) the Physical Fitness and Readiness Facility; and (6) the Phoenix Project.

## III. Process Improvements

## Sustainable Construction



*The Integrated Sustainable Design and Constructability Team incorporates a new "Sustainable & Constructability" design methodology into the construction process.*



*10 York Turbo Master Chillers with 3000hp electric motors, which take in water from the Potomac River cool it & condense it and return it to the River. The chillers use Freon 22 and are .62kw/ton efficient.*

### Metro Entrance Facility Highlights on Meeting LEED Certification Criteria

- Met Site Prerequisite for Erosion and sedimentation Control.
- Prevent loss of soil during construction by storm water runoff and/or wind erosion, including protecting topsoil by stockpiling for reuse.
- Prevent sedimentation of storm sewer or receiving streams and/or air pollution with dust and particulate matter

### Alternative Transportation:

Locate building within ½ mile of a commuter rail.

### Landscape and Exterior Design to Reduce Heat Islands:

Use ENERGY STAR roof-compliant, high-reflectance roofing AND low-emissivity roofing for a minimum of 75% of the roof surface.

### Light Pollution Reduction:

Meet Lighting for Exterior Environments AND design interior and exterior lighting such that zero direct beam illumination leaves the building site.



*The benches at the new facility are constructed from Ipe' wood. Ipe' wood is naturally weather and insect resistant that is forested from a Forest Stewardship Council certified forest.*

### III. Process Improvements



## PROGRAM MANAGEMENT

Like any major project, the Pentagon Renovation Program involves multiple, often competing interests. Every organization has a unique stake in the outcome of the renovation. Beyond traditional owner-contractor interests, the project owner, the Department of Defense, is an amalgam of organizational components and interests. In addition, there are regional energy, transportation, historical, and planning groups whose considerations that must be incorporated into the renovation process.

Following September 11, the Program staff has continued to work long hours. For example, on the Phoenix Project, workers continued to work two 10-hour shifts, six days a week. While there are many challenges with keeping the PENREN staff focus positive, PENREN senior leadership continues to motivate the staff through individual recognition and awards. A Certificate of Appreciation was presented to each employee by the OSD in recognition of group achievement for their efforts following the September 11 attack. PENREN has received tremendous support and assistance from companies, corporations, industries, and private citizens across the country. The Program acknowledges these contributions with a personal thank you letter from the Program Manager.

Demonstrated pride and patriotism by all Program staff have made it possible for PENREN to keep focus and stay ahead of schedule.



*Special "All Hands" meetings are held to keep Program members abreast of all activities and projects, and to address staff and management concerns.*



*Daily foreman's meetings are held to keep construction projects on track.*

## III. Process Improvements

## Program Management

## PENTAGON RENOVATION PROGRAM TEAM STRUCTURE

